

Work Sheet

Our Reference No. PT-1949001

Applicants Name: Dialysis Solutions Inc.

Serial No. 10/020,882

Examiners Name: John D. Pak

Mass Balance for the components of dialysis composition.

Concentrate as specified contains:

g/L= gram /Litre

[NaCl] 90.72±9.0 g/L

[NaHCO<sub>3</sub>] 28.35 ±2.8 g/L[MgCl<sub>2</sub>] 0.96±0.9 g/L

Molecular weights (MW): from periodic table in Merck Index specified in grams/mole

[Na] = 22.989768 g/mol

[Cl] = 35.4527 g/mol

[Mg] = 24.3050 g/mol

[HCO<sub>3</sub>]= (1.00794+12.011+3\*15.9994) = 61.01714 g/mol

To determine the ion concentrations in the dialysis solution

Breaking [NaCl] into its ion components by weight:

[Na] part: 90.72 / (22.989768+35.4527)\* 22.989768= 35.68692 g

[Cl] part: 90.72-35.68692= 55.03308g

Breaking [MgCl<sub>2</sub>] into its ion components by weight:

[Mg] part: 0.96/ (24.3050+35.4527\*2)\* 24.3050=0.245066g

[Cl] part: 0.96-0.245066=0.7149g

Breaking [NaHCO<sub>3</sub>] into its ion components by weight:

[Na] part: 28.35/ (22.989768+61.01714)\*22.989768=7.758409 g

[HCO<sub>3</sub>] part: 28.35-7.758409= 20.5915g

Total Mass of ions per Litre of concentrated solution from above

[Na] : 35.68692 g+7.758409 g=43.44533 g

[Mg] : 0.245066 g

[Cl] : 55.03308g + 0.7149g = 55.74798g

[HCO<sub>3</sub>]: 20.5915 g

Using 80 ml (0.08L) of the solution added to 1 Litre of water the following content of in the dialysis solution will be achieved:

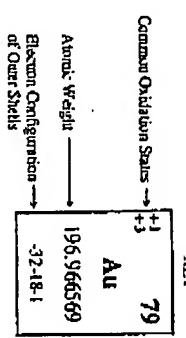
$$[\text{Mg}]: \frac{0.245066 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 24.3050 \text{ g/mol}} = 0.746 \text{ mmol/L} \text{ or } .75 \pm 10\% \text{ mmol/L}$$

$$[\text{Cl}]: \frac{55.74798 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 35.4527 \text{ g/mol}} = 116.48 \text{ mmol/L} \text{ or } 116 \pm 10\% \text{ mmol/L}$$

$$[\text{Na}]: \frac{43.44533 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 22.989768 \text{ g/mol}} = 139.98 \text{ mmol/L} \text{ or } 140 \pm 10\% \text{ mmol/L}$$

$$[\text{HCO}_3]: \frac{20.5915 \text{ g} / \text{L} * 0.08 \text{ L} * 1000 \text{ mmol/mol}}{1.08 \text{ L} * 61.01714 \text{ g/mol}} = 24.998 \text{ mmol/L} \text{ or } 25 \pm 10\% \text{ mmol/L}$$

## PERIODIC CHART OF THE ELEMENTS

<sup>+1</sup> H 1.0074 <sub>-1</sub>	<sup>+1</sup> Li 6.94 <sub>-2</sub>	<sup>+1</sup> Be 9.012182 <sub>-2</sub>	<sup>+1</sup> B 10.81 <sub>-1</sub>	<sup>+1</sup> C 12.0107 <sub>-2</sub>	<sup>+1</sup> N 14.0067 <sub>-2</sub>	<sup>+1</sup> O 15.9994 <sub>-2</sub>	<sup>+1</sup> F 18.99843 <sub>-1</sub>	<sup>+1</sup> Ne 20.1797 <sub>-2</sub>	<sup>+1</sup> He 4.002602 <sub>-2</sub>
Common Oxidation States →									
Atomic Weight →									
Electron Configuration →									
of Outer Shells									
<b>KEY</b> 									
<sup>+1</sup> Na 22.990703 <sub>-2</sub>	<sup>+1</sup> Mg 24.31050 <sub>-2</sub>	<sup>+1</sup> Al 26.981536 <sub>-2</sub>	<sup>+1</sup> Si 28.0855 <sub>-2</sub>	<sup>+1</sup> P 30.973762 <sub>-2</sub>	<sup>+1</sup> S 32.0683 <sub>-2</sub>	<sup>+1</sup> Cl 35.453 <sub>-2</sub>	<sup>+1</sup> Ar 39.948 <sub>-2</sub>	<sup>+1</sup> Kr 83.1798 <sub>-2</sub>	<sup>+1</sup> Xe 131.203 <sub>-2</sub>
Transition Elements									
<sup>+1</sup> K 39.0983 <sub>-2</sub>	<sup>+1</sup> Ca 40.0783 <sub>-2</sub>	<sup>+1</sup> Sc 44.955112 <sub>-2</sub>	<sup>+1</sup> Ti 47.867 <sub>-2</sub>	<sup>+1</sup> V 50.9415 <sub>-2</sub>	<sup>+1</sup> Cr 51.9951 <sub>-2</sub>	<sup>+1</sup> Mn 54.938045 <sub>-2</sub>	<sup>+1</sup> Fe 55.895 <sub>-2</sub>	<sup>+1</sup> Co 58.931195 <sub>-2</sub>	<sup>+1</sup> Ni 58.6954 <sub>-2</sub>
<sup>+1</sup> Rb 82.94078 <sub>-2</sub>	<sup>+1</sup> Sr 87.612 <sub>-2</sub>	<sup>+1</sup> Y 88.906535 <sub>-2</sub>	<sup>+1</sup> Zr 91.1224 <sub>-2</sub>	<sup>+1</sup> Nb 92.906538 <sub>-2</sub>	<sup>+1</sup> Mo 95.94 <sub>-2</sub>	<sup>+1</sup> Tc (97.9072) <sub>-2</sub>	<sup>+1</sup> Ru 101.97 <sub>-2</sub>	<sup>+1</sup> Rh 102.91650 <sub>-2</sub>	<sup>+1</sup> Pd 106.42 <sub>-2</sub>
<sup>+1</sup> Cs 132.905519 <sub>-2</sub>	<sup>+1</sup> Ba 137.317 <sub>-2</sub>	<sup>+1</sup> Sr 138.9102 <sub>-2</sub>	<sup>+1</sup> Hf 138.9102 <sub>-2</sub>	<sup>+1</sup> Ta 138.9124 <sub>-2</sub>	<sup>+1</sup> W 139.9073 <sub>-2</sub>	<sup>+1</sup> Re 140.9124 <sub>-2</sub>	<sup>+1</sup> Os 141.9127 <sub>-2</sub>	<sup>+1</sup> Ir 141.9127 <sub>-2</sub>	<sup>+1</sup> Pt 143.9127 <sub>-2</sub>
<sup>+1</sup> Fr (223.0191) <sub>-2</sub>	<sup>+1</sup> Ra (226.0254) <sub>-2</sub>	<sup>+1</sup> Sr (228.0108) <sub>-2</sub>	<sup>+1</sup> Rf (262.1141) <sub>-2</sub>	<sup>+1</sup> Db (264.1219) <sub>-2</sub>	<sup>+1</sup> Sg (264.12) <sub>-2</sub>	<sup>+1</sup> Bh (266.1388) <sub>-2</sub>	<sup>+1</sup> Hs (268.1388) <sub>-2</sub>	<sup>+1</sup> Mt (270.1388) <sub>-2</sub>	<sup>+1</sup> Ds (272.1355) <sub>-2</sub>
Actinides									
Actinides									
<sup>+1</sup> La 138.90347 <sub>-2</sub>	<sup>+1</sup> Ce 140.116 <sub>-2</sub>	<sup>+1</sup> Pr 140.90763 <sub>-2</sub>	<sup>+1</sup> Nd 144.242 <sub>-2</sub>	<sup>+1</sup> Pm (144.9127) <sub>-2</sub>	<sup>+1</sup> Sm 150.156 <sub>-2</sub>	<sup>+1</sup> Eu 151.956 <sub>-2</sub>	<sup>+1</sup> Gd 157.235 <sub>-2</sub>	<sup>+1</sup> Tb 158.95355 <sub>-2</sub>	<sup>+1</sup> Dy 162.00 <sub>-2</sub>
<sup>+1</sup> Th (237.0277) <sub>-2</sub>	<sup>+1</sup> Pa (237.03805) <sub>-2</sub>	<sup>+1</sup> U (237.03891) <sub>-2</sub>	<sup>+1</sup> Np (237.0382) <sub>-2</sub>	<sup>+1</sup> Pu (244.06342) <sub>-2</sub>	<sup>+1</sup> Am (241.0604) <sub>-2</sub>	<sup>+1</sup> Cm (247.0603) <sub>-2</sub>	<sup>+1</sup> Bk (251.0796) <sub>-2</sub>	<sup>+1</sup> Cf (252.08389) <sub>-2</sub>	<sup>+1</sup> Es (257.0855) <sub>-2</sub>
<sup>+1</sup> Ac (277.0277) <sub>-2</sub>	<sup>+1</sup> Th (231.03581) <sub>-2</sub>	<sup>+1</sup> Pa (238.02891) <sub>-2</sub>	<sup>+1</sup> U (237.0382) <sub>-2</sub>	<sup>+1</sup> Np (241.0642) <sub>-2</sub>	<sup>+1</sup> Pu (243.0642) <sub>-2</sub>	<sup>+1</sup> Am (247.0642) <sub>-2</sub>	<sup>+1</sup> Cm (251.0742) <sub>-2</sub>	<sup>+1</sup> Bk (255.0742) <sub>-2</sub>	<sup>+1</sup> Cf (257.0842) <sub>-2</sub>

Note: Atomic weights are based on the 2001 IUPAC Atomic Weights of the Elements and the 2005 Revised IUPAC Periodic Table of the Elements. Values in parentheses are used for certain radionuclides; this value is the relative atomic mass of the isotope of that element of longest known half-life.

Note: Elements with atomic numbers 112 and above have been reported but not fully authenticated.  
\* Symbols based on IUPAC systematic names